

2004 GALVESTON BAY INVASIVE SPECIES RISK ASSESSMENT
INVASIVE SPECIES SUMMARY

Created by: Environmental Institute of Houston, University of Houston-Clear Lake
and the Houston Advanced Research Center

Common Name: Saltcedar, tamarisk																								
Latin Name: <i>Tamarix ramosissima</i>																								
Category: Terrestrial Plant																								
Place of Origin: native to Asia and southeastern Europe http://www.fs.fed.us/database/feis/plants/tree/tamram/distribution_and_occurrence.html (Accessed 21 March 2003).																								
Place of Introduction: Unknown																								
Date of Introduction: 1800's http://www.nps.gov/plants/alien/fact/tama1.htm (Accessed 21 March 2003)																								
States Effected: <table border="0" style="width: 100%;"> <tr> <td>Arizona</td><td>Georgia</td><td>Nebraska</td><td>North Dakota</td><td>Texas</td></tr> <tr> <td>Arkansas</td><td>Kansas</td><td>Nevada</td><td>Oklahoma</td><td>Utah</td></tr> <tr> <td>California</td><td>Louisiana</td><td>New Mexico</td><td>South Carolina</td><td>Virginia</td></tr> <tr> <td>Colorado</td><td>Mississippi</td><td>North Carolina</td><td>South Dakota</td><td></td></tr> </table> http://plants.usda.gov/cgi_bin/plant_profile.cgi?symbol=TARA					Arizona	Georgia	Nebraska	North Dakota	Texas	Arkansas	Kansas	Nevada	Oklahoma	Utah	California	Louisiana	New Mexico	South Carolina	Virginia	Colorado	Mississippi	North Carolina	South Dakota	
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Life History: <p>“Sexual reproduction: Saltcedar flowers are primarily insect pollinated [15]. A mature saltcedar plant can produce 600,000 seeds annually [19,25,41,43]. Saltcedar generally flowers in its third year of growth or later, but may flower during the first year [43]. Seeds are very small with a tuft of hair at one end, which aids in dissemination by wind and water [19,23].</p> <p>Seed viability and germination: Viability generally lasts for only a few weeks, especially at high temperatures [19]. The seeds will germinate on saturated soils or while afloat. Once wetted, fresh seeds usually germinate within 24 hours regardless of light conditions [19,23].</p> <p>Seedlings: Seedlings grow slowly and require saturated soils throughout the first 2 to 4 weeks of growth. They will not survive more than 1 day without moist soil. Seedlings can survive submergence for several weeks but are uprooted by weak currents. Slowly receding water levels along river or reservoir banks create optimum seedbeds, but permanent survival requires several months without subsequent flooding [19,23]. Seedlings are very resistant to desiccation [15].</p> <p>Vegetative reproduction: Saltcedar sprouts from the root crown and rhizomes [23,25,41,52]. Severed stems and shoots of saltcedar readily root in moist soil, but once dry, they rapidly lose this ability. Adventitious roots sprout from submerged or buried stems [23].” http://www.fs.fed.us/database/feis/plants/tree/tamram/distribution_and_occurrence.html (Accessed 21 March 2003). </p>																								
Growth/Size: <p>“A mature saltcedar plant can produce 600,000 seeds annually [19,25,41,43].</p> <p>Seed viability and germination: Viability generally lasts for only a few weeks, especially at high temperatures [19]. The seeds will germinate on saturated soils or while afloat. Once wetted, fresh seeds usually germinate within 24 hours regardless of light conditions [19,23].</p> <p>“Most saltcedars, or tamarisks, are deciduous shrubs or small trees growing to 12 -15 feet in height and forming dense thickets. <i>Tamarix aphylla</i> is an evergreen tree that can grow to 50 feet tall and tends to flower during the winter.” http://www.nps.gov/plants/alien/fact/tama1.htm (Accessed 21 March 2003). </p>																								
Habitat: <p>“Saltcedar commonly forms pure stands in disturbed riparian areas of the Southwest. Published classifications listing saltcedar as a dominant are listed below:</p> <p>Ecological study of southwestern riparian habitats: techniques and data applicability Classification of riparian habitat in the Southwest Riparian forest and scrubland community types of Arizona and New Mexico </p>																								

Saltcedar is sometimes found with the following species: sandbar willow (*Salix exigua*), New Mexico forestiera (*Forestiera neomexicana*), Fremont cottonwood (*Populus fremontii*), boxelder (*Acer negundo*), Gambel oak (*Quercus gambelii*), fourwing saltbrush (*Atriplex canescens*), greasewood (*Sarcobatus vermiculatus*), salt grass (*Distichlis stricta*), and rabbitfootgrass (*Polypogon monspeliensis*).”

Saltcedar commonly occurs along floodplains, riverbanks, stream courses, salt flats, marshes, and irrigation ditches in arid regions of the Southwest. It often forms pure thickets that extend for miles. It is one of the most widely distributed and troublesome weeds along water courses in park lands of the Southwest. In the Great Plains, saltcedar is common along streams, in low undrained areas, and around lakeshores. It is especially common in the Arkansas and Cimarron river valleys and occasionally on dry hillsides.

Water requirements: Saltcedar is a facultative phreatophyte. Its roots may penetrate soil 30 feet (9.1 m) or more, but the plant cannot survive if moisture is suddenly removed from the root zone. It generally grows where the depth of the water table does not exceed 25 feet (7.6 m), and normally where it is less than 15 feet (4.6 m). Dense stands will grow only where the water table is between 5 and 20 feet (1.5-6 m) below the soil surface. If the water table is less than 5 feet (1.5 m) from the surface, the plants branch profusely and do not form a dense stand. Once established, saltcedar can tolerate both drought and flooding. By shedding its leaves and halting growth, it can withstand lengthy drought periods. Additionally, saltcedar can tolerate inundation for up to 3 months.

Soils and dissolved solids: Saltcedar grows well on moist sand, sandy loam, loam, and clay soil textures. It has a wide range of tolerance to saline and alkaline soil and water. It has been found growing in Death Valley, California, where the groundwater contains as much as 5 percent dissolved solids. It copes with high concentrations of dissolved solids by absorbing them through its roots and excreting excess salts through the glands in its stems and leaves. Eventually, these salts end up on the ground beneath the plant, forming a saline crust.

Shade-tolerance: Saltcedar is highly susceptible to shading. Shaded plants have altered leaf morphology and reduced reproduction.

Elevational range: Saltcedar occurs from below sea level to more than 7,000 feet (2,134 m) in elevation. Elevational range for several western states is as follows:

Utah: 4,200 to 7,000 feet (1,280-2134 m)

Colorado: 3,400 to 7,400 feet (1,036-2,256 m)

Wyoming: 3,200 to 7,300 feet (975-2,225 m)

http://www.fs.fed.us/database/feis/plants/tree/tamram/distribution_and_occurrence.html (Accessed 21 March 2003).

“Saltcedar establishes in disturbed and undisturbed streams, waterways, bottomlands, banks and drainage washes of natural or artificial waterbodies, moist rangelands and pastures, and other areas where seedlings can be exposed to extended periods of saturated soil for establishment. Saltcedar can grow on highly saline soils containing up to 15,000 ppm soluble salt and can tolerate alkali conditions.” <http://www.nps.gov/plants/alien/fact/tamal.htm> (Accessed 21 March 2003).

Attitude (aggressive, etc.):

“Saltcedar is a pioneer or colonizing species that establishes on freshly exposed alluvium, sand and gravel bars, and streambanks or other floodplains after disturbance [4,44,46]. Once established it often occurs in pure stands, persisting indefinitely in the absence of disturbance [4,6,16]. A decrease in river fluctuations can rapidly shift sites from habitats dominated by native vegetation to pure stands of saltcedar [21]. Saltcedar is a slow starter that does not compete well in established communities. Throughout most of its range, periodic burning, clearing, or flooding have caused saltcedar communities to remain in a youthful stage; therefore, little is known about its place in the natural succession of the floodplain community [11].”

http://www.fs.fed.us/database/feis/plants/tree/tamram/distribution_and_occurrence.html (Accessed 21 March 2003).

“This species has been nominated as among 100 of the "World's Worst" invaders”

<http://www.issg.org/database/species/ecology.asp?si=72&fr=1&sts=> (Accessed 21 March 2003).

Physical Description:

“Saltcedar is a long-lived (50-100 years), dense, deciduous shrub or tree 6 to 26 feet (2-8 m) tall [17,22,42]. Branches are smooth, slender, flexible, and break off easily [9,17,22,42]. The crown is narrow or rounded [30]. Branches are covered with minute, scalelike leaves, 0.02 to 0.03 inch (0.5-1.0 mm) long [17,22,42]. The bark of saltcedar is smooth, becoming furrowed and ridged with age [30]. The wood is soft and white [42]. Saltcedar has a deep taproot and extensive lateral rhizomes. Secondary root branching is profuse upon contact with water [4,15].” http://www.fs.fed.us/database/feis/plants/tree/tamram/distribution_and_occurrence.html (Accessed 21 March 2003).

Management Recommendations / Control Strategies: include references for existing site-specific strategies

” Control/herbicides: Saltcedar is difficult or impossible to kill by burning, drought, freezing, hypersalinity, prolonged submersion, or repeated cutting at ground level [34]. However, saltcedar can be controlled using a combination of methods [23,34].

Some herbicides used for saltcedar control are 2,4-D, dicamba, Tordon, Triclopyr ester, and Arsenal [23,25,34]. The herbicide Silvex has been used successfully to control saltcedar, but several restrictions have been placed on its use. The U.S. Department of Interior has totally prohibited its use on Interior lands [20].

For control using cut-stump/herbicide treatments the following steps should be followed: Cuts should be made within 2 inches (5 cm) of the ground surface; the herbicide should be applied to cut stumps within several minutes after cutting; the entire circumference of the cambium layer should be cut and treated; sprouting foliage should be cut and treated within a year after the initial treatment [34].

Biological control: In its native range, 115 insect species and four mites are known to attack saltcedar. A few may be candidates for biological control [15].” http://www.fs.fed.us/database/feis/plants/tree/tamram/management_considerations.html (Accessed 21 March 2003)

“Management of saltcedar requires a long term commitment to maintain at low levels and prevent reinfestation. A variety of methods have been used in the management of saltcedar, including mechanical, chemical and biological. The most effective management probably involves a combination of these. Mechanical techniques include hand-pulling, digging, root-cutting, use of weed eaters, axes, machetes, bulldozers, fire and flooding. Removal by hand is generally recommended for small infestations of saplings under 1-inch diameter. Root-cutting and bulldozing may be effective but are costly, labor intensive and may cause extensive damage to soils and lead to resprouting. Fire has been used with some success, but because saltcedars are fire-adapted, they readily resprout after fire. Flooding can be used to control salt cedar if root crowns remain submerged for at least three months.

For extensive infestations of saltcedar, chemical control has been shown to be the most effective method. Cautious use of herbicides aids in restoration of saltcedar infested sites by allowing repopulation by native plant species. Systemic herbicides (e.g., those that kill the plant from the root up) are recommended for saltcedar management and application methods include foliar sprays, cut stump treatments, basal bark treatments, and aerial sprays. Because tamarisk usually grows in or adjacent to streams, wetlands and other waterways, it is important to use products registered for aquatic application.

Fifteen insects are being investigated as potential biological control agents for saltcedar. Two of these, a mealybug (*Trabutina mannipara*) and a leaf beetle (*Diorhabda elongata*), have preliminary approval for release. Five others are being tested within the United States and an additional eight species are under study overseas. Final approval for release of the mealybug and the leaf beetle is pending resolution of concerns regarding their potential impact to the southwestern subspecies of the willow flycatcher (*Empidonax trailii extimus*), a federally endangered bird. In parts of its range where native willows, its natural nest trees, have been replaced by saltcedar, the willow flycatcher now utilizes it for this purpose. Concern is over the possibility that, due to the environmental damage caused by tamarisk, native plant species may not be able to replace it if the biological control agents succeed in eliminating it.” <http://www.nps.gov/plants/alien/fact/tama1.htm> (Accessed 21 March 2003).

Agencies Collecting Data:

U.S. National Park Service
Texas A&M University

References (includes journals, agency/university reports, and internet links):

1. FEIS - http://www.fs.fed.us/database/feis/plants/tree/tamram/distribution_and_occurrence.html
2. PCA - <http://www.nps.gov/plants/alien/fact/tama1.htm>
3. STPL - http://www.wes.army.mil/el/pmis/plants/html/tamarix_.html
4. TAMU - <http://bc4weeds.tamu.edu/saltcedar.html>
5. ARS - <http://www.nal.usda.gov/ttic/tektran/news/saltcedar.htm>
6. USGS - <http://usgssrv1.usgs.nau.edu/swepic/asp/swemp/data.asp?Symbol=TAMAR2>
- 7.

Available Mapping Information:

PLANTS - http://plants.usda.gov/cgi_bin/plant_profile.cgi?symbol=TARA
PCA - <http://www.nps.gov/plants/alien/map/tama1.htm>
STPL - http://www.wes.army.mil/el/pmis/plants/html/tamarix_.html